

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPE 8189

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Tetrode.
See figure 1.
Operating position: Vertical, base down or up
Weight: 1.5-pound nominal (680 grams).

ABSOLUTE RATINGS: Pulse modulated (R load)

Parameter:	F	Ef	Eb	Ec1	Ec2	Ib	ib	ik
Unit:	MHz	V ac	kV dc	V dc	V dc	mA dc	a	a
Maximum:	110	7.9	30	-1,000	2,500	---	8.0	12.0
Minimum:	---	7.1	---	---	---	---	---	---
Test conditions:	---	7.5	2.5	Adjust	500	400	---	---

ABSOLUTE RATINGS: Pulse modulated (R load)

Parameter:	Pp	Pg1	Pg2	TE	T(seal)	Duty	Cooling
Unit:	W	W	W	°C	°C	1/	2/
Maximum:	1,000	25	75	225	200	---	---
Minimum:	---	---	---	---	---	---	---
Test conditions:	---	---	---	---	---	---	3/

See footnotes at end of table I.

GENERAL:

Qualification: Required.

TABLE I. Testing and inspection.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1</u>		<u>8/</u>					
Filament current	1301	---		If	20.0	22.7	A ac
Peak emission	1231	---	eb = ec1 = ec2 = 2,500 v	is	+15.0	---	a
Electrode current (screen)	1256	---		Ic2	0	+20	mA dc
Electrode voltage (1) (grid)	1261	---		Ec1	-15	-35	V dc
Total grid current	1266	<u>4/</u>		Ic1	---	-25	μA dc
Primary grid emission (control)	1266	---	Ef = 8.25 V ac; Pg1 = 30 W or Ic1 = 150 mA dc; t = 15 seconds; anode and screen grid floating	Isg1	---	-250	μA dc
Primary grid emission (screen)	1266	---	Ef = 8.25 V ac; Pg2 = 90 W or Ic2 = 160 mA dc; t = 15 seconds; Ec1 = 0; anode floating	Isg2	---	-250	μA dc
Electrode voltage (2) (grid)	1261	---	Eb = 30 kV dc; Ec2 = 2,500 V dc; Ec1/Ib = 30 μA dc	Eco	---	-600	V dc
Operation of vacuum modulators	3269	---	Ebb = 35 kV dc; Ec2 = 2,500 V dc; Ec1 = -1,000 V dc (max); tp = 10 μs; prf = 2,000; egk/ib = 1.4 a; t = 5 minutes (see figure 2)	---	---	---	---
<u>Conformance inspection, part 2</u>		<u>5/</u>					
Low-frequency vibration	1031	---	No voltages	---	---	---	---
Bump	1036	---	Angle = 10°	---	---	---	---
Amplification factor (g1 to g2)	1316	---	Ec2 = 1,000 V dc; Ic2 = 75 mA dc; Eb = 0	Mu	6.1	7.7	---
Direct-interelectrode capacitance	1331	---		{ Cgp Cin Cout	---	0.35 23.8 9.4	pF pF pF

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 2</u> - Continued		5/					
Current division; short pulse (method B)	1372	---	Eb = 3,000 V dc; Ec2 = 2,500 V dc; Ec1 = -500 V dc; egk/ib = 5.0 a	$\left\{ \begin{array}{l} \text{egk} \\ \text{ic1} \\ \text{ic2} \end{array} \right.$	---	150 250 3.0	v ma a
<u>Conformance inspection, part 3</u>		6/					
Life test	---		Group C; power oscillation; t = 500 hours	---	---	---	---
Life-test end points:	---						
Peak emission	1231	---		is	12.0	---	a
Primary-grid emission (control)	1266	---		lsg1	---	-250	μA dc
Primary-grid emission (screen)	1266	---		lsg2	---	-250	μA dc

- 1/ During operation under pulsed conditions, duty shall be maintained at low enough level that average tube dissipation ratings are not exceeded. For pulse lengths in excess of 0.1 second, some reduction of electrode dissipation ratings will be required.
- 2/ Adequate forced-air cooling shall be provided to maintain base and anode seal temperatures below their maximum ratings. In all cases of operation, it is recommended that a heat-radiating connector, EIMAC HR-8, or equivalent, be installed on the anode terminal, and that a socket and chimney be employed which provide for cooling of the seals. The following table applies to the sockets referenced on Drawings 259-JAN and 293-JAN, with the chimney as referenced on Drawing 293-JAN, at sea level, and with air at 25°C, and should be considered as minimum cooling requirements. The approximate pressure drop values given for the socket referenced on Drawing 259-JAN are as measured in the socket; those for the socket as referenced on Drawing 293-JAN are measured in the equivalent of a pressurized chassis or plenum chamber. The data applies with maximum rated anode dissipation.

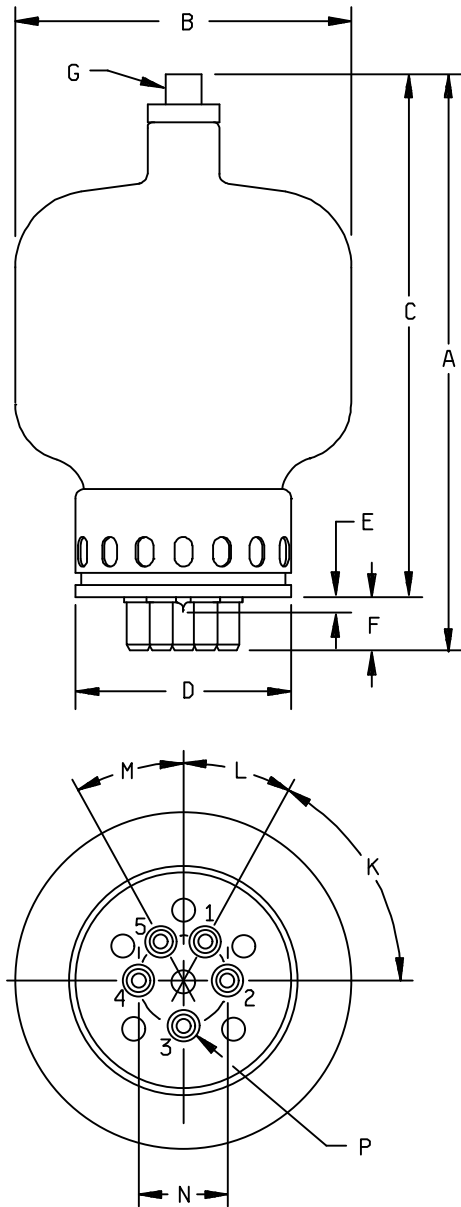
Frequency	Socket and chimney (see Drawing 259-JAN)		Socket and chimney (see Drawing 293-JAN)	
	Airflow (cfm)	Approximate pressure drop (In.H ₂ O)	Airflow (cfm)	Approximate pressure drop (In.H ₂ O)
30 to 110 MHz	35	1.9	35	1.0
Below 30 MHz	20	0.6	20	0.42

Cooling air shall be supplied before or simultaneously with the application of filament voltage and may be removed simultaneously with filament voltage. Operation at higher altitudes or higher ambient temperatures will require an increase in cooling airflow.

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TABLE I. Testing and inspection - Continued.

- 3/ During all electrical tests involving application of filament power, forced-air cooling of the tube is allowable and a heat-dissipating connector (EIMAC Type HR-8, or equivalent) may be used on the anode terminal.
- 4/ This test is to be the first test performed at the conclusion of the holding period.
- 5/ When type 8166 of MIL-PRF-1/37 and type 8189 are physically identical, and have been made in the same production period, differing only in high voltage processing and testing of type 8189, then one sample may represent both types insofar as the listed tests are identical.
- 6/ When type 8166 of MIL-PRF-1/37 and type 8189 are physically identical and have been made in the same production run, differing only in high voltage processing and testing of type 8189, then one life-test sample may represent both types.
- 7/ Revision letters are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.
- 8/ This specification uses an accept on zero ($c = 0$) sampling plan in accordance with MIL-PRF-1, Table III. For conformance inspection, part 1 tests, the MIL-PRF-1, Table III accept on zero defect sampling plan shall be that for category X.



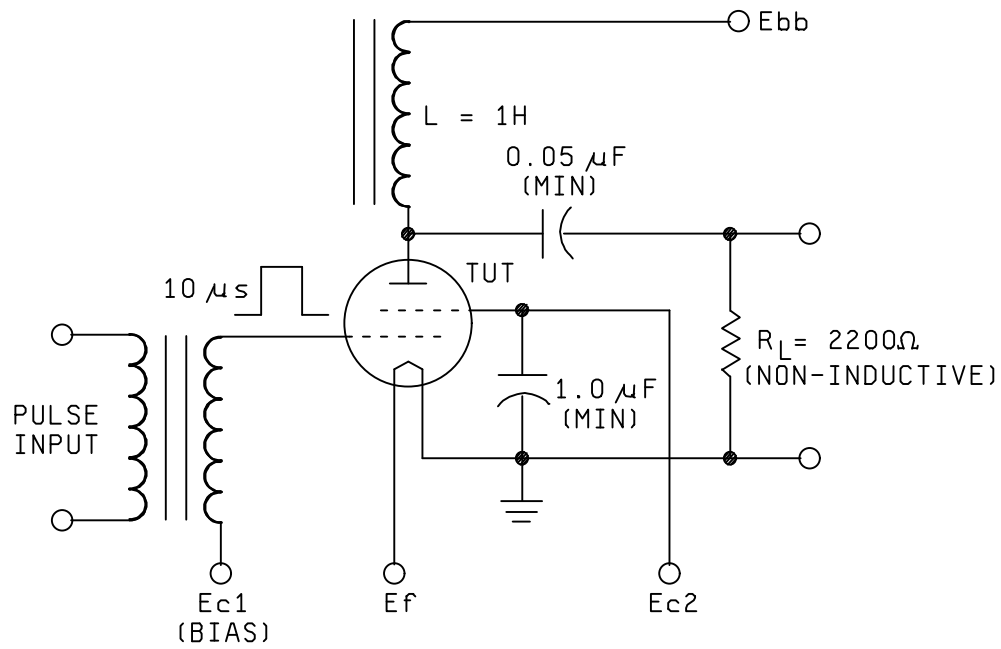
Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	8.875	9.625	225.43	244.48
B	---	5.250	---	133.35
C	8.000	8.750	203.20	222.225
E	---	.313	---	7.95
Conformance inspection, part 3 (see note)				
D	---	3.625	---	92.08
F	.825	.925	20.96	23.50
G	Cap: C1-26 (EIA)			
N	1.495	1.505	37.97	38.23
P	.371	.377	9.42	9.58
Reference dimensions				
K	60°			
L	30°			
M	30°			

Pin connections	
Pin No.	Element
1 and 5	f
2 and 4	g2
3	g1
Cap	a

NOTE:

Dimensions listed under conformance inspection, part 3, shall be checked annually, using an accept on zero defect sampling plan on a sample of four tubes. In case of failure, the failing dimension(s) shall become a part of conformance inspection, part 2, for three consecutive successful submissions, at which time the test may revert to the conformance inspection, part 3, basis.

FIGURE 1. Outline drawing of electron tube type 8189.

FIGURE 2. Operation test circuit.

Custodian:
 Army - CR
 Navy - EC
 Air Force - 11
 DLA - CC

Review activities:
 Navy - AS, CG, MC, OS, SH
 Air Force - 99

Preparing activity:
 DLA - CC
 (Project 5960-3566)